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FOUNDED BY WILLIAM HUNTING, F.R.C.V.S.

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NEMATODES AND DRUGS.

Prof. Craig's comprehensive paper upon this subject raises a broad question that must often have been in the minds of all thinking members. Despite the diligence with which the profession has devised prescriptions against nematodes for generations, how much progress has been made? Are there not still many diseases due to nematodes for which a satisfactory direct medicinal treatment has yet to be found?

The answer is not encouraging. On the whole, very little solid therapeutical advance against nematodes has been made in our time. Some nematodes, such as the equine and canine ascarides, can be successfully dealt with by drugs. But in the case of a great number of others, including many of those which cause the most serious economic losses, it is more than doubtful whether any anthelmintic treatment is of value. More than this, it is not clear that any great future advance can be hoped for. The more closely the difficulties of dealing with such parasites as the abomasal and intestinal strongyles of ruminants or the equine sclerostomes are considered, the less likely does it appear that any very successful anthelmintic treatment against them will ever be discovered.

It would be well to admit all this; for in doing so we do not admit veterinary science helpless against disease from nematodes: we simply concentrate ourselves upon those resources which we know to possess value against nematodes. Anthelmintics seem of little or no use against many, and for these it were better to discard them. But good feeding and tonics will do much good, in cases not too far advanced; and preventive measures will do even more. Veterinarians who appreciate this can still do much valuable work for the stock-owner, even if they have lost some of their old faith in drugs.

PARASITIC MANGE.

The Board of Agriculture's returns indicate that there is not much less equine mange in the country than there was when the Mange Order was suspended last August. Clearly the Order was not re-imposed too soon; and the practitioners should see that its provisions are enforced. Before the war, we were making steady progress against mange; but it must be confessed that that progress was somewhat slow. It will take us some time to gain the position we might have held but for the enforced suspension of the Order.

MILK FEVER BEFORE CALVING.

By J. H. PARKER, M.R.C.V.S., Faringdon.

Called last Wednesday to a big, fine, dual-purpose shorthorn cow, due with her third calf. Found her in a staggering condition, and she blundered down and nearly broke her neck. Showed symptoms of rapidly approaching coma, and about a yard of fœtal membranes were hanging from the vulva.

A vaginal examination showed the presentation of calf to be normal, and as the passages were not fully dilated I left her to calve herself, which she did. We pumped the udder up and gave her a purgative.

Next morning she was clear in her head, but could not get up. Gave her another purgative, and the following day she was up and doing well.

INTERDIGITAL ABSCESSES IN A SPANIEL TREATED BY VACCINE.

By HENRY TAYLOR, F.R.C.V.S., Haywards Heath.

The subject had been a patient sufferer from interdigital abscesses for over two years—abscesses which were much more painful and much larger than one generally meets with.

All surgical measures had been tried, with no result as far as the recurrence of them was concerned. The dog had been under chloroform several times, and extensive patches of skin had been removed, but this nor anything else made any difference. It was therefore decided to try the effect of a vaccine, and swabs were sent to Evans, Sons, Lescher & Webb, Ltd., of Crofton Lodge, Higher Runcorn, Cheshire, in order that they might prepare such. Their report was as follows:—

REPORT.

Cultivations made from this specimen have yielded cultures of the following organisms:—

Staphylococcus albus.

A Diphtheroid bacillus.

From these an autogenous vaccine has been prepared, of which six vials are sent herewith, each vial contains 1 c.c. and has 300 million organisms in all, made up of 200 million of the former organism, and 100 million of the latter organism.

H. E. ANNETT.

The vaccine was injected into the skin of the inside of the thigh, after painting the site of the injection with tincture of iodine. There were no constitutional disturbances nor any local swelling as a result in any of the six injections.

The dates upon which the doses were given were April 20, 26, May 3, 13, 21 and 29.

Apparently the vaccine had no effect in stopping the recurring abscesses, for they appeared with about the same regularity as before. As a matter of fact, since the injection of the vaccine, he once had *three* feet affected at one time, whereas previously he never had more than two. Further, there was no diminution in the size of the abscesses.

I have just set out the bare facts of the case, but seemingly the results are not encouraging. Perhaps someone would like to try on another case the effect of more doses. For the six doses the cost was only half-a-guinea.

ABSTRACTS FROM FOREIGN JOURNALS.

The existence of Anthrax Bacilli in Bone Marrow.

K. Grabert has published the results of experiments he has made to determine the length of time for which anthrax bacilli present in the bone marrow of animals dead of anthrax can resist destruction (*Zeitschr f. Infectionkr. parasit. Krankh., und Hyg. d. Haust.*) The question is of great importance in the bacteriological diagnosis of anthrax.

Grabert examined the bones of 52 animals dead from anthrax—42 cattle and 10 sheep. The bones were preserved a long time, partly exposed in a room, and partly contained in a basket filled with earth. For examination the medullary cavity of the tibia was opened by sawing the bone transversely; and a piece of marrow about the size of a pea was removed and mashed in a fluid culture medium, from which two "passages of dilution" were then made.

Grabert succeeded in culturally demonstrating the existence of anthrax bacilli in the bone marrow six weeks after the death of the animal in one case, and four weeks after death in two other cases. In general, during the colder season, it was possible to obtain numerous colonies of anthrax bacilli, for the most part almost in pure culture, for from two to three weeks after death. After three weeks there were numerous negative cases, and after more than three weeks the result was doubtful.

During the warmer season, the culture test from bone marrow may fail a fortnight after the death of the animal.

The inoculation test proved itself, as has already appeared from similar experiments of Bougert and Fischœder, to be less worthy of trust than the culture test. In a fairly large number of cases, in which the bacilli in the medulla were few, the inoculation test yielded negative results.

Grabert concludes that the bacteriological examination of the bone marrow offers a certain means of demonstrating the existence of anthrax bacilli in many cases in which cultural tests from the viscera (spleen) and from the blood are negative.—(*La Clinica Veterinaria*).

The Susceptibility of the Pig to Black-Quarter.

Arloing, Cornevin, and Thomas found the pig to be almost completely immune against black-quarter. Afterwards, Marek, Born, Batristini, Willenberg, and others demonstrated black-quarter in the pig. Prof. Stefan von Rätz, of Budapest, has supplied further experimental evidence (*Allatorvosi Lapok*). He experimented with nine pigs, which he inoculated intra-muscularly with fresh muscle juice and muscle emulsion obtained from cattle dead from black-quarter. All the nine became affected. Seven showed a crepitant swelling of more or less volume at the region of inoculation. The other two went lame after the inoculation; and in one a general reaction also appeared. Three pigs died; and in two of these the characteristic appearances of black-quarter were found in the muscles.

The weight of the pigs ranged from 13 to 20 kilogrammes (= roughly from 28½ to 44 lbs); and the maximum amount of virus injected was 4 c.c. The experiments prove that pigs are not absolutely immune against intentional infection with black-quarter, that some even die of it, and that in these cases a sero-hæmorrhagic inflammation arises in the muscles which is just as severe as that seen in the muscles of cattle.—(*Berliner Tier Woch*).

A Trypanosome of the Dog,

Discovered in the Oran District of the Sahara.

C. Vialette has recorded this case.—(*Bull. Soc. Path. Exot.*, 1915, Feb. Vol. 8, No. 2, pp. 70-72). The animal in which the trypanosome was discovered showed a train of symptoms similar to those generally encountered in cases of trypanosomiasis, and in the later stages there was paralysis of the hind quarters. Examination of the blood on a number of occasions showed that the parasite was sometimes numerously present, sometimes in small numbers, and sometimes quite absent.

The trypanosome ranged from 17 to 24 microns in length, and from 1.5 to 2 microns in width. The free portion of the flagellum measured from 3.5 to 5 microns. The posterior extremity of the body was always more or less obtuse, and granules were frequently present in the anterior half of the body.

Experiments are being carried out with the object of identifying the parasite if possible; but the author appears to incline to the view that the trypanosome closely resembles, at least from the morphological point of view, *T. Soudanense* var. *berbera*. —(*Tropical Veterinary Bulletin*).

Ointment of Iodide of Potassium and Mercury.

Lanceleur has published the following formula for an absorbent mercurial ointment (*Revue vét. mil.*) Five grammes potassium iodide are rubbed up in a mortar and dissolved in a little glycerine, and, after solution, are mixed with twenty grammes of mercurial ointment. The preparation should be used when freshly made. For application, the hairs are cut off; and the ointment is first laid on with the finger and then vigorously rubbed with a hard tambon for a period of from three to five minutes. Twelve hours later small vesicles appear; but irritation is never present. The slight swelling

soon disappears; and the epidermis shrivels and becomes detached ten days later.

The ointment is especially recommended for hæmatomata of the knee and for "pressure swellings." Deeply situated cysts are cured with three or four applications; and, in cases of swellings of the tendons, better results are often obtained with this ointment than with sharp blisters. Its application may be repeated every sixth or seventh day. —(*Berliner Tier Woch.*)

W. R. C.

THE VETERINARY MEDICAL ASSOCIATION OF IRELAND.

(National V.M.A.—Irish Branch).

A general meeting was held on Thursday evening, 20th May, in the Gresham Hotel, Upper Sackville Street, Mr. Watson (President) in the Chair. There were also present:—Messrs. Prentice, Howard, Wilkinson, Patrick, McShane, Loughran, Norris, Magee, Doyle, and Profs. Craig and O'Connor.

The Hon. Sec. read letters apologising for inability to attend from Mr. Winter and Mr. J. P. Small, and a letter from Miss Mulcahy, sister of Mr. W. F. Mulcahy, stating that the latter died in November, 1913.

There being no objection, the minutes of the general meeting held in November, and of the annual general meeting held in January, both of which had been printed and circulated, were signed by the Chairman.

On the motion of the Chairman, it was decided that a vote of condolence be sent from the Association to Miss Mulcahy, the Hon. Sec. to state that the members were not aware of his demise until the intimation read that evening was received.

Benevolent Fund.

The President: I suppose the majority of you gentlemen are subscribers to the Veterinary Benevolent Fund and have received a copy of the accounts for the year 1914. I think every member of the profession should subscribe to this very worthy fund. I do not know how it stands with regard to Ireland at present, but certainly up to last year beneficiaries received more from the fund than the amount of the Irish subscriptions. Is that the way it is?

The Hon. Sec.: I fancy it is. Two received 10s. a week,—£52.

The President: We are not doing our duty even if we just exactly meet the disbursements. That would be rather a shameful proposition to live up to. I would advocate in all seriousness that we do our very best individually to get subscribers to this very excellent fund. (Hear, hear).

The Hon. Sec.: As a member of the Irish Committee, I endorse what you have said with regard to this fund. It is a very good fund, and seeing how necessary it is, everyone in Ireland should subscribe. It is really a shame everyone does not. I hope that anyone who is not a subscriber will become one at once, as the fund is doing very good work.

Mr. Wilkinson: Are the subscriptions due now?

The Hon. Sec.: Yes.

Mr. McKenny's Resignation.

The President: At the last meeting a deputation was appointed to wait upon Mr. McKenny and ask him to reconsider his decision as to his resignation. Prof. O'Connor, Prof. Craig, and myself waited on Mr. McKenny, and used all our powers of eloquence, persuasion and logic with him, but I am sorry to have to report that we did so in vain. Mr. McKenny was absolutely adamant, and could not possibly see his way to reconsider his decision. I am sure I am expressing the opinion of all the members of the Association when I say that it is a very serious loss to us. However, as Mr. McKenny has taken up this attitude it is a matter for the meeting to consider, that we shall have to accept his resignation with regret.

Mr. Wm. Cargill Patrick: I propose that the Honorary Associateship be conferred on Mr. McKenny, an old, trusted, and worthy member of the association. He has been the hardest working member, and, indeed, the Association seems to have been the object of his life. Although we all may not have seen eye to eye with him now and again, it was due to one's own particular viewpoint. I know that Mr. McKenny was for the good of the Association on every occasion, and he is deserving of any honour the Association can confer on him.

Mr. Prentice: I second the resolution. Mr. McKenny will be missed, and will be a great loss to these meetings.

Mr. Magee: I would like to support that, and I cannot help feeling very glad that Mr. Patrick was the man to propose that such an honour be conferred on Mr. McKenny. As he said, we did not always see eye to eye with Mr. McKenny. Mr. McKenny never saw eye to eye with any member of the Association—and never will. No man agreed absolutely with the ideas of another. Mr. McKenny has many sterling qualities, and everyone has their little peculiarities. I am quite conscious of having my own. Certainly, Mr. McKenny was for the benefit of the Association. There is one remark I would like to make—probably no one in this room is more indebted to Mr. McKenny than I am, and I never let an opportunity pass of stating that. People often say that "there is no one that cannot be done without," but Mr. McKenny was an exception, for there were certain times in the history of this Association when he could not be done without, and were it not for him the Association would have been *non est* at the present time.

Mr. Howard: I think it is unnecessary for individual members of the Association to advocate this proposal, as it is the most sincere wish of every member—those who are not present as well as those who are—that Mr. McKenny should continue to be a member. I am sorry I was not one of the deputation. I would not have accepted his refusal. He would have to come back.

The President: The Roll of Honour of this Association contains many distinguished names. Perhaps our old friend, Mr. McKenny, is not a great scientist, but he certainly has great enthusiasm for the profession. He never hesitated for one moment to do what he considered was right and proper. In that he stands second to none. I am sure there is no one present but would be delighted to have Mr. McKenny's name on the Roll of Honour. (Hear, hear).

Is it your wish and pleasure that Mr. McKenny's name shall be placed on the list of Honorary Associates of the Association?

The resolution was passed unanimously.

Report of Council.

A meeting of the Council was held of April 8th.

A letter was read from Mr. Bullock, Secretary of the Royal College of Veterinary Surgeons, enquiring what response had been made to the R.C.V.S. circular relating to members of the Association joining the A.V.C. The Hon. Secretary was instructed to write to Mr. Bullock, giving the particulars asked for, enclosing a summary of the replies received up to date.

The Hon. Treasurer was instructed to pay the account of the Gresham Hotel, the subscription to the Veterinary Benevolent Fund, and also to send a subscription to the National Veterinary Association according to the number

of members of the V.M.A.I. who had paid their subscription for 1914.

It was arranged that the general meeting be held in the Gresham Hotel, on May 20th, a 7.30 p.m. The subject for discussion to be Prof. Craig's paper on "The use of drugs in the treatment of disease caused by Nematode worms," as prepared for the 10th International Congress. Copies of the paper to be circulated with the notices convening the meeting.

Report of Council was unanimously approved and adopted.

PAPERS FOR DISCUSSION.

Mr. MAGEE inquired if it had been made a rule, as proposed by Prof. Mettam, that all papers be printed and circulated before they come up for discussion at the meetings.

The CHAIRMAN: I do not think it is a rule of the Association, but the suggestion has been acted upon. Notice of motion was handed in to that effect, but it was withdrawn on the understanding that the Association would reconsider the whole of the rules. It was thought convenient that everyone should have a copy of the paper before it was discussed.

Prof. CRAIG: Perhaps I may explain the circumstances in which this paper was printed. My reason is that the present paper is very much condensed, and I thought it would be better that it should be in your hands before you came to the meeting, so that any remarks you wished to make would have been thought over before any discussion took place, and it would then go on in a more lively fashion. Personally I would rather that you should read it than that I should have to read it to you.

Mr. MAGEE: Everyone knows the difficulty that the Hon. Secretary has in getting a paper for the meetings, even at the last moment, and the difficulty of having papers printed and circulated would be greater. Although it might be a splendid idea, to my mind it is not really workable always. Of course it is quite a different thing at the grand "pow-wows" of the International Congress. I was afraid it had been made a rule here.

THE USE OF DRUGS IN THE TREATMENT OF DISEASE CAUSED BY NEMATODE WORMS.*

By Professor J. F. CRAIG, M.A., M.R.C.V.S.,

Royal Veterinary College of Ireland, Dublin.

The class of nematode worms includes a large number of species which infest the domestic animals. Many of these species are extremely common parasites, but usually only cause disease when in large numbers and under certain conditions. As a rule, the most serious trouble is experienced amongst young stock. Some species often set up outbreaks of disease which may be likened to and in many cases are far more serious than contagious bacterial affections. As a rule, each species of nematode develops only in one, rarely two or more species of domestic animals. When taken up by its host it passes to and occupies quarters in certain specific situations. Frequently several species of worms are associated in the one animal.

The serious effects of invasion by these parasites vary very considerably and are frequently not characteristic. They may be local, depending on the position of the parasite, or general. The general symptoms associated with the presence of worms are unthriftiness, debility, and anæmia. Occasionally ascarides cause nervous symptoms. As for local symptoms, the nematodes in the alimentary tract may be responsible for diarrhœa. Ascarides occasionally cause impaction and even rupture of the bowel in horses; in the respiratory tract the nematodes cause bronchitis and pneumonia. It must, however, be remarked that some species of nematode worms appear to produce no symptoms, and even although those which occasionally do so may be present in considerable numbers, the host may appear in excellent health.

This may be due to the method of action of these animal parasites in producing disease. They may act mechanically, produce toxins, or inoculate bacteria into the tissues of the host. Accumulating in great numbers in the intestines, ascarides may cause obstruction and by compression they may occasion even rupture and perforation of the bowel wall. In the bronchi and bronchial tubes strongyles may obstruct the passage of air. Penetrating the circulatory apparatus the embryos of filariæ may cause the production of emboli and aneurisms. Provided with an oral armature, certain worms, such as ankylostomes and sclerostomes, injure the mucous membrane, suck blood, and inflict lesions which may be accompanied by hæmorrhage. Mechanical irritation may provoke reflex nervous symptoms, such as convulsions or epileptiform fits, in the hosts of ascarides, but these troubles may also be attributed to the action of toxins formed by helminths. Leroy has observed the perienteric liquid of the *Ascaris equorum* kill a dog in half to one hour in the dose of 8 c.c. to 10 c.c. per kilo body-weight. Weinberg and Julien injected the sterile liquid from the same source into the conjunctival sac and nasal chambers of horses and observed a marked local irritation in animals not carriers of ascarides, but the reaction was not shown by carriers, probably because they had acquired some immunity against the toxin. Hæmolysins and anti-coagulins have been shown to be developed in the bodies of certain worms, ankylostomes, sclerostomes, ascarides. In the *Strongylus equinus*, hæmolysin is present in largest proportion in the cephalic portion of the worm. It may be said that these agents are developed by the worms for their own use in dealing with the blood derived from their hosts, but it is probable that some toxins are absorbed. This is more likely to occur when the worms die, as in the case of *Bibothriocephalus latus*, and then anæmia, emaciation, etc., result. With reference to the inoculation of bacteria, Weinberg has examined the intact tumours of the *Spiroptera megastoma* of the horse's stomach and found numerous bacteria in them. Dionisi attributes the pulmonary lesions in sheep affected with *S. filaria* to *Bacillus ovisepticus*. Tricocephales, oxyurides, sclerostomes, spiroptera, which are capable of fixing themselves to the intestinal wall, inoculate the germs which adhere to the surface of their body. The ascarides favour infection by rubbing against the mucous membrane. Adult worms, their embryos or larvæ, emigrating into the bileducts, peritoneum, circulation, and different organs, transport bacteria with them. The results will depend upon the nature of the bacteria inoculated.

The action of nematodes is therefore not absolutely dependent on numbers and on depriving the host of its nourishment. The serious results produced by their presence depend upon the toxicity of the toxins manufactured by the worms, the susceptibility of the host, the mechanical damage the parasites may do, and the variety of the bacteria they inoculate. In the latter case, when the bacteria enter the tissues and produce disease they are the agents to which the attention of the clinician must be directed.

The first object in all treatment of disease is to remove the cause—in this case the nematode worms. The removal of the worms is brought about by means of anthelmintics. The anthelmintics commonly used are oil of turpentine, coal tar creosote, carbolic acid, lysol, empyreumatic oil, naphthalin, thymol, santonin, arsenious acid, potassium, antimony tartrate, common

*Presented at the Tenth International Veterinary Congress, London, 1914.

salt, sulphate of copper, sulphate of iron, areca nut, male shield fern, chenopodium, picrate of potash, kamala, kousso, quassia, oil of cade, carbon disulphide, asafœtida, eucalyptol, benzine, pomegranate, pumpkin seeds. The action of these drugs is to destroy or in some way affect the worms so that they are easily expelled from the body. They can thus only produce their effects when the worms are situated in a tube which leads to the exterior of the body. They do not act upon the nematodes in the tissues and their action is hampered when the worms burrow into the walls of the tube in which they live. Many of the drugs do not destroy the worms for a long time when in contact outside the body, and it is therefore probable that they only lower their vitality inside the body. Santonin, *e.g.*, does not destroy round worms; it would appear that it to some extent makes them drunk, so that they are no longer able to maintain their equilibrium in the intestine and they are swept out by the movements of the bowel itself or by the purgative medicine which has been introduced (Lauder Brunton). In the use of these drugs care must be taken not to use toxic doses, but a sufficient quantity and proportion to exert a direction action upon the parasites. None of the agents mentioned is absolutely specific for certain species of nematodes, and hence the various anthelmintics are employed, either singly or in combination, against all the nematodes, according to the tolerance of the patient, the cost, convenience in administration, their efficacy, or the idiosyncrasy of the practitioner. The mode of administration of these remedies is affected to some extent by the position of the parasites. The most common nematode parasites occupy some part of the alimentary canal or the respiratory tract. When dealing with the worms in the stomach or intestines it is necessary to have these organs as empty as possible by with-holding food and water for twelve or twenty-four hours to allow the drug, without undue dilution, to come into direct contact with the parasites. The anthelmintic may be accompanied or followed by a laxative, the latter is usually unnecessary when there is diarrhœa. The difficulties attending the removal of the worms can only be noted when the particular cases are referred to. When the worms are expelled the symptoms will disappear, unless some serious damage has been done to the tissues of the host. In the latter case treatment often fails. On that account anthelmintics are, in many instances, only of service in the early stages of disease, in some cases even before symptoms are set up.

The second part of the treatment consists in counteracting the effects of the worms by a generous diet and a course of tonics. Some of the anthelmintics, such as arsenic and sulphate of iron, will act in this way. If diarrhœa is present, it ought to be relieved by astringents. A generous diet is a most essential part of the treatment, and is often more important than the drugs usually recommended. As a rule, parasites flourish more readily in the body of a debilitated animal. It may be that in debility the media furnished by the host are more favourable to the development of the parasite, or that in a stronger body antitoxins are formed which inhibit the development of large numbers of worms or prevent their effects.

A third part of the treatment consists in preventing reinfection or preventing infection of susceptible animals sufficient to produce disease. It may be taken as an axiom in helminthology that each worm in the body develops from an egg, embryo or larva, which has entered from without. Worms do not go on multiplying indefinitely within the host. Hence the degree of possible infection depends upon the amount of contamination of materials taken in by a susceptible animal. At pasture this is often associated with overstocking. Reinfection can only be prevented when the ports of entry and the life-history of the worms are known. So far as we know, the large proportion of the nematode parasites enter the body with the food or water. In what way may drugs be used as preventative agents? In herbivora common salt should be added to the food or free access given to it. It will destroy some of the embryos or larvæ picked up, as well as stimulate digestion. Infection often occurs at pasture, and hence on infected lands the application of common salt or sulphate of iron in the proportion of 3 to 5 cwt. to the acre in the spring will be of service in destroying the eggs, embryos or larvæ which have survived the winter. When animals are known to have been exposed to infection, periodic doses of anthelmintic medicine should be given at intervals, even before the symptoms appear. This is a measure especially applicable amongst young herbivora. It is often successful with cattle, sheep and horses when they are grazing on infected pastures, especially low-lying, marshy lands, in preventing serious outbreaks of diseases due to strongylidæ and other worms. Indeed, it is attended with greater success than curative treatment when the symptoms of disease have been produced.

I shall now refer to particular cases according to the position of the parasites and in doing so will try to avoid repetition.

Nematodes of the Alimentary Canal.

In equines one of the most common anthelmintics used is oil of turpentine in doses of 1 to 2 oz. It is given in the morning fasting, either as a single dose with one pint of linseed oil, or administered on two or three successive mornings in a pint of milk and followed by oil or other purgative. Potassium antimony tartrate is another good agent given in 1 to 4 dr. doses on several successive mornings in a mash of bran or in a little oats and then followed by a laxative, such as linseed oil or aloes 4 dr. and calomel 1 dr. A convenient method with foals is to give no water the evening before dosing, dissolve the drug in a pail of water and offer it in the morning before feeding (Grimme). If the diet is laxative, such as grass or bran mashes, a purgative may not be necessary. This drug is especially useful against *Ascaris megalocephala*, it is not always efficacious, but may be repeated, is safe and improves the condition of the horse. White arsenic in doses of 3 to 10 gr., together with sulphate of iron 2 dr., is also a good anthelmintic, given in the oats or in a ball each morning for seven days and then followed by a purgative. Copper sulphate in 1 to 2 dr. doses, given with a vegetable bitter in the same way as arsenic, is also very useful. Other drugs used include santonin ½ to 1 dr. doses (this drug does not appear to be so effective in horses as in dogs), carbon disulphide 3 to 4 dr. for adults, 1½ to 2 dr. for foals in gelatine capsules, given three or four times at intervals of two hours after starving for twelve to twenty-four hours and followed in twelve to twenty-four hours by linseed oil or aloes, carbolic acid, or lysol 1 dr. in a pint of milk daily for a few days, followed by a purgative, thymol 10 gr. to 1 dr., depending upon the age, in ball, or in suspension in milk, administered for three days and followed by a laxative and after an interval of four days, if necessary, continued again. In this country it is common to give a mixture of these agents in powder in the feed, or in a ball, e.g., white arsenic 5 gr., sulphate of iron 2 dr., potassium antimony tartrate 2 dr., each morning for seven days, followed by a purgative on the seventh day. The agents are of very great service against *A. megalocephala*, which occupies the small intestines, sometimes the stomach and colon, but they may require to be repeated after an interval in larger doses. In some cases, however, the first symptoms produced by the presence of the worms in foals and young horses are those of impaction or rupture of the bowel. In the latter case nothing can be done to save the animal, and in the

former it is not easy to discover the cause of the impaction. Fortunately, a purgative often expels some of the worms. Of the nematode worms of the intestinal tract of the horse the most serious are the various species of the strongylinæ (Sclerostomata), of which the types are the *S. armatus* and *Cylicostomum tetracanthum*. The adult worms inhabit the cæcum and the double colon and are often attached to the mucous membrane. The larvæ are often embedded in the mucosa of the bowel and the *Strongylus vulgaris* in its larval form invades the anterior mesenteric artery and its branches to the cæcum and colon, occasionally the cœliac axis and other vessels, causing endarteritis, aneurism, and thrombosis of these vessels. During the past ten years I have found these worms in the anterior mesenteric artery in 80 per cent. of horses. The adult Strongylinæ in the bowel are very difficult to get rid of and certainly the larvæ in the bowel wall, and the *S. vulgaris* in the vessels is not acted upon by the agents we have already noted. Thymol was introduced in the hope that it might be of service, but it also only acts upon the nematodes in the bowel. An interval is allowed between the courses of medicine in the belief that the larval worms may pass from the bowel wall into the lumen. One reason that the action of vermicides is not very certain, even on the adult strongylinæ in the cæcum and colon, is that the agents given are partly absorbed before they reach these organs, and are very much diluted in the contents of these organs, which always contain a huge mass of ingesta, even after withholding food or fluids for many hours or days. Hence arsenic in its solid form is more likely to exert a vermicidal effect upon the worms than some of the other more soluble agents. To be of service anthelmintics must be used before acute symptoms set in or the disease is far advanced.

Occasionally an enteritis is set up by the worms of the tetracanthum group and death follows very rapidly, even before any treatment can be adopted, especially in foals and young horses. This may be the first indication of infection. When the larvæ are present in large numbers in the mucosa and submucosa of the bowel, anæmia, debility, emaciation, and even diarrhœa set in. Here not only have we to deal with a worm infection, but also an invasion of the pathogenic organisms carried by these worms, as indicated by Weinberg. Anthelmintics in these cases are of no use, better results will follow a generous diet—oats, hay, milk and eggs, and a course of general tonics, liquor arsenicalis, carbonate of iron, quinine sulphate, but even then the prognosis is not favourable. The lesions in the anterior mesenteric artery due to *Strongylus vulgaris* are occasionally followed by rupture of that vessel in young animals, and a fatal hæmorrhage results; sometimes large numbers of emboli are cast off and set up an embolic enteritis. In adults, however, aneurism and thrombosis of the mesenteric artery are frequently present without causing trouble, symptoms of colic which have been attributed to this cause can, as a rule, be prevented without any reference to these worms. Bockberg recommends in these infections in foals the intravenous or subcutaneous injections of atoxyl. In an outbreak which he dealt with among forty foals, eight died before treatment, and of the others twelve showed very marked symptoms of infection. The doses of atoxyl used varied from 3 to 7½ gr., in some cases as much as 15 gr. was given, and in one case 22½ gr., in 1 per cent. solution with 1 per cent. sodium chloride in water. Great improvement followed. Dorn recommends the intravenous injection of a 3 per cent. solution of atoxyl.

The Oxyurides, *Oxyuris curvula* and *mastigodes*, frequently infest the colon and rectum of horses. In the rectum they sometimes cause irritation and rubbing of the tail. The anthelmintics already noted given by the mouth have no marked effect upon these worms; they may act as adjuvants. The most efficacious treatment consists of the use of vermicide enemata, such as a 5 per cent. solution of common salt, 1 per cent. solution of lysol, an injection of vinegar, soap and water, an infusion of quassia or tobacco (1 oz. shsg tobacco to 30 oz. water), perchloride of iron (Tr. ferri. perchlor. 1 to 2 oz. 2 quarts of water). One quart of one of these solutions is injected each morning for three or four days, after removing the fæces by hand from the rectum. The symptoms soon disappear. *Spiroptera megastoma* and *microstoma* are sometimes found in the stomach, the former producing small tumours in the stomach wall, although they produce no evidence of their presence during life. Major Martin, in Poona, noted a case of rupture of the stomach due to this cause. Spiroptera were almost constant parasites of equines in that region. On experiment he found that the worms were not dislodged or affected by anthelmintics; even arsenic in 20 gr. doses twice daily for three days had no effect upon them.

In ruminants Strongylidæ of a number of different species are parasitic in the abomasum and intestines, causing very serious symptoms of gastro-enteritis, with anæmia. Of the strongyles of the abomasum, among sheep the most common in this country are *Hæmonchus contortus* and *Strongylus cervicornis*, and in cattle *S. convolutus* (*Ostertagia ostertagi*) and *Strongylus gracilis* (*Tricho-strongylus extenuatus*). Some of these parasitic in the intestines are the *Strongylus ventricosus* (*Cooperia oncophora*), *Uncinaria cernulum* (*Bunostonum trigonocephalum*) in the small bowel and the *Sclerostomum hypostomum* (*Chabertia ovina*) in the large bowel of sheep and goats. Although some of these worms are common in ruminants of all ages, it is in young animals grazing on certain infected pastures that they cause disease, in lambs from three to nine months old, in cattle from six months to two and a half years. As to the action of vermicides on them, McFadyean, experimenting with specimens of the *Strongylus convolutus* isolated from the contents of the abomasum of an ox, observed that they were killed by a 1 per cent. lysol in five minutes, and after twelve hours' exposure to ½ per cent. lysol and chloroform water, but some only were destroyed in that time by 1 per cent. carbolic acid while in oil of turpentine 1 to 40 of milk, Fowler's solution of arsenic 1 in 40 of water, the worms remained active. Oil of turpentine is often used as the anthelmintic in these cases in doses of ½ to 1 dr. to a sheep in 1 oz. of milk, and 2 oz. to young cattle given in a pint of milk or gruel in the morning. Coal tar creosote is especially recommended by Stiles. It has given very variable results, and this may depend to some extent on its variable composition. In a 1 per cent. solution the doses are—For lambs four to twelve months old, 2 to 4 oz; sheep one year old and over, 3 to 5 oz.; calves, 5 to 10 oz.; yearling cattle, 1 pint. One dose is said sometimes to be sufficient to effect a cure in sheep. Thymol in doses of 30 gr. to a lamb, 50 gr. to a yearling, 2 dr. to cattle, made into a paste with water and given in ½ pint of water to a sheep, or 1 pint to an ox, has given good results in the hands of some practitioners. It may be combined with creosote, and is repeated in a few days.

As the result of the experiments of M'Fadyean, already referred to, the hope was entertained that in lysol was found a specific agent, against Strongyles of the abomasum and intestines in ruminants. For young cattle the dose advised was 4 dr. in one quart of water, followed at intervals of two or three days by doses of 2 to 4 dr. In sheep half a pint of 1 per cent. solution has been given, followed by good results; but some owners assert that violent quivering of the muscles and immediate death may follow its administration. A common mixture used for sheep is ℞ chloroform 10 minims, ol. tereb. ½ to 1 dr., lysol 10 minims, aquæ 2 oz.

given three or four times in a fortnight. Arsenic, in my hands, has given better results than other drugs, in cattle from 5 to 10 gr., together with 2 dr. sulphate of iron; in sheep, arsenic 2 gr., iron sulphate 10 gr., given daily for six days in oats or bran. Dr. Theiler has shown that 15, 30 and 45 gr. arsenic in single doses cause no ill effects in adult sheep, whether they they are watered twenty-four hours after or immediately after dosing. In sheep this method of treatment has the advantage that no drenching or handling is required. Drenching of sheep is attended with some danger and difficulty in a large flock. Copper sulphate is another remedy which may be given either dry in the food or in 1.2 per cent. solution. In South Africa it has been been recommended in a drench as a safe remedy in sheep. According to Dr. Thieler 22 gr. is a safe dose for an adult sheep, whether the animal is watered directly after the dosing or only twenty-four hours later. The addition of liquid to the copper sulphate increases the toxicity of the drug. It is used in doses of 4 gr. for lambs three month old; 8 gr. for lambs six moths old; 10 gr. for sheep one year old; ½ to 1 dr. for calves. Other drugs used are male shield fern, benzine, picrate of potash, Charbert's empyrumatic oil, and tobacco. In all cases before administration the animals are taken up and not allowed food or water for twelve hours. With all the agents used variable results have been obtained and recorded, and they do not appear to correspond with the experiments made with the drugs upon worms outside the body. This may be due to one of two causes. In the first place all drugs taken in by the mouth pass directly into the rumen and recticulum and mix with the ingesta there before passing through the omasum to the abomasum and intestines. It has been asserted by Stiles and others that agents given while the animal is in the standing position or by probang are carried directly through the œsophageal groove and omasum to the abomasum. That I have shown on several occasions to be quite an erroneous belief. Hence, drugs given in liquid form are diluted to a large extent before they can act upon the strongyles in the abomasum, and even to a greater degree in the intestines. Probably on that account I have noted quite frequently at *post-mortem* examinations large numbers of live worms in the abomasum of animals which have received vermicidal treatment. In the second place, treatment is often not commenced till the symptoms are far advanced and the tissues not likely to recover from the damage which they have suffered, even although the strongylidæ are removed. Greater success has been attained in the treatment of disease due to *Hæmonchus contortus* in sheep than in the case of smaller strongyles, probably because the latter penetrate into the glands of of the abomasum. The smallest of the species thus often cause more severe losses than the larger species. Those worms which have entered the mucosa are not acted upon by the medicinal agents used. In cattle, tonics and astringents are administered after the anthelmintics, in order to relieve the symptoms of diarrhœa and anæmia. Reinfection is difficult to prevent unless the animals are taken up and housed. In all cases a generous diet, such as cakes and oats, is absolutely essential, and the measures adopted which have been noted in connection with the prevention of reinfection generally. Worm nodules in the intestines of native cattle and sheep, due to Œsophagostomata, are not observed in this country. As a rule, they do not interfere with the fattening of cattle and sheep, but in any case anthelmintics will only act upon the adult worms in the lumen of the bowel, they will have no effect upon the larvæ in the worm nodules. Marotel and M. Velu have met with enzootics of œsophagostomiasis in bovines, due the *Œsophagostomum radiatum*, in which the symptoms were similar to those of gastro-intestinal strongylosis, and the mortality was great. No medicinal treatment proved of any service.

Ascarides are uncommon in the small intestines of ruminants in this country. They may be treated with success with any of the anthelmintics used for strongyles, and followed by a purgative.

In swine the most common nematode parasites are Ascarides (*Ascaris suilla* or *suum*). They develop in the small intestines, but occasionally pass into the stomach and bile ducts. In young swine one of the most common symptoms is convulsions, especially after feeding. A dose of 10 to 20 gr. of calomel is often sufficient to dislodge these worms. For sucking pigs, Bru recommends calomel given in milk, followed by castor oil; for older pigs on a mixed diet, decorticated castor meal 1½ to 2 dr. associated with calomel, powder of male shield fern, wormwood and pomegranate seeds, then replaced by sulphate of magnesium or soda. The symptoms disappear rapidly. Extract of male shield fern (1 to 2 dr.), or areca nut (2 to 4 dr. for adults, 1 to 2 dr. for young pigs) given daily in the morning in milk or flour for a few days, and followed by a laxative such as calomel, or calomel and jalap, is also very useful. A similar form of treatment might also be tried in the uncommon conditions where a gastric catarrh is set up by the *Gnathostomum hispodum* or *Arduenna strongylina*. Reinfection is prevented by giving vermifuge medicines to all in-contact pigs, destroying the eggs and parasites in the manure by mixing the latter with lime, and disinfecting the styes and troughs with boiling water.

In the dog and cate Ascarides (*Belascaris marginata* and *Belascaris cati*) are extremely common parasites. They usually occupy the small intestines, but occasionally enter the stomach. In puppies only a few weeks old they frequently set up symptoms; but one must note that many puppies are dosed for worms when they are really suffering from distemper. Santonin is one of the best anthelmintics against these worms. It is given in doses of 1-8th gr. per lb. body-weight, but not more than 4 gr. should be given in a single dose. It is administered in pill with calomel (¼ gr. to 3 gr.) or jalapin (1-8th to 2 gr.), or suspended in syrup of buckthorn (1 to 4 dr.) in the morning, after fasting for twelve hours. It may be repeated if necessary after an interval of three days. On account of the toxic nature of the drug great care must be taken in its administration to toy puppies; indeed, it should not be applied till the puppies are eight weeks old. Under that age a simple laxative may be given, which often brings away quite a number of worms. To the laxative 1 or 2 minims of oil of chenopodium might with safety and advantage be added. Other valuable drugs used are extract of male shield fern (8 to 60 m.) in pill or capsule, kamala (½ to 2 dr.) in milk, freshly ground areca nut (in the proportion of 2 gr. per lb. body-weight), in pill, capsule, or suspension in syrup of buckthorn, thymol (3 to 8 gr.) in pill or capsule, either accompanied or followed in one or two hours by a laxative. If the dog vomits the medicine it may be repeated in a few days, preceded by a stomach sedative such as bismuth carbonate or chloretone.

There have also been recommended cortex or pomegranate, pumpkin seeds and oil of turpentine. As a rule the drugs which I have mentioned are very efficacious. When an animal is affected with fits attributable to these worms, it is necessary to administer a course of sedatives, such as bromide, until the worms are got rid of. To prevent the worms in puppies it is advisable to give the bitch a dose of vermifuge medicine not later than the sixth week of pregnancy, and in addition to destroying the fæces and disinfecting the kennel, wash the mammary glands with a disinfectant solution. Ankylostomiasis in the dog, due to *Ankylostoma caninum* and the *Unciaria stenocephala* which infest the small

intestines, appears to be rare in this country. In the cat a similar condition has been observed in Italy. The treatment employed is similar to that for Ascarides, but it is far more difficult to get rid of the worms on account of their attachment to the mucous membrane. Extract of male shield fern and kamala are specially recommended. Mègnin advises kamala in doses of 45 gr. to 1 dr. with 3 to 7 gr. of calomel and .075 to .09 grm. of arsenic. Thymol or eucalyptol might be useful judging from results obtained and ankylostomiasis in the human subject. A generous diet (milk, eggs, flesh-food), cod-liver oil and tonics are very necessary to counteract the anæmia and debility. When the disease is advanced treatment is of little service. Animals frequently re-infect themselves, and it has to be remembered that the infection may occur not only through the food and water, but even through the skin (Cuillè). The kennel and food utensils must be thoroughly cleansed and the fæces destroyed.

In infection with *Spiroptera sanguinolenta* in the dog, or *Ollulanis bicupsis* in the cat, the condition is not diagnosed during life, and treatment is purely palliative, devoted to relief of the symptoms.

Nematodes of the Respiratory Tract.

In the ass, occasionally in the horse, *Strongylus arnfieldi* (*Dictyocaulus arnfieldi*) infests the bronchial tubes, and in large numbers sets up a bronchial catarrh. It is probable that the same treatment employed for cattle might be equally beneficial for equines, but these parasites are often present in the ass without causing serious trouble. Among young cattle from six months to two and a half years bronchitis is caused by the presence in the bronchial tubes and trachea of *Strongylus micrurus* (*Dictyocaulus viviparus*), rarely the *Strongylus pulmonaris*. It is extremely common in this country towards the end of summer and during autumn in animals grazing on certain lands. The earliest methods of treatment consisted in giving agents by the mouth similar to those advised for gastro-intestinal strongylosis, such as oil of turpentine, creosote, assa-fœtida. It must be remembered that many cases of verminous bronchitis are complicated with the gastro-enteritis caused by the strongylidæ of the alimentary canal; indeed, in some outbreaks I have met with, the latter was responsible for a large proportion of the losses. On that account the agents given by the mouth are useful to deal with complications, and to some extent may destroy the larvæ of the bronchial strongyles taken in with the food. Oil of turpentine and other drugs are excreted by the lungs, but in too small a proportion to exert a vermicidal action upon the nematodes of the bronchial tubes. The administration of drugs, such as sulphuric ether and oil of turpentine, by the nostrils, does not appear to me to be justified by the results; the effects are similar to those produced by drenching, and the method of administration is objectionable. Fumigations were later introduced to combat the disease. The various materials used for the purpose included burning tar, rags, feathers, horsehair, sulphur, chlorine and iodine. In some districts sulphur dioxide and iodine are still used apparently to the satisfaction of the owner. For sulphur dioxide fumigations the calves are turned into a house in which all the openings are carefully stopped up, and sulphur burned on the floor until the operator can stand the fumes no longer. Then the burning of sulphur is stopped, and the calves kept in it for half an hour or until the calves show symptoms of dyspnœa. This is carried out on several occasions at intervals of one or two days. This method is not free from danger to the patient. With iodine inhalations each animal is treated separately. A small quantity of iodine is placed on a hot brick in a bucket enclosed in a sack, and the head of the calf covered with e latter. The inhalation is continued until the animal becomes affected with a fit of coughing. The most popular form of treatment at present in vogue is that introduced by Levi, of Pisa, and consists in the intratracheal injection of anthelmintics mixed with glycerine, oil, or water. By this means the vermicides are brought into direct contact with the worms and embryos. Common mixtures are (1) Carbolic acid, 10 minims; chloroform, ½ dr.; ol. tereb., glycerine, aa 1 dr.; (2) olive oil, 10 parts; ol. tereb., 100 parts, carbolic acid, 2 parts. One dose is 2½ dr. The material is given by intratracheal injection every second or third day on two or three occasions. For the injection a strong syringe and needle are required. The skin over the trachea is best incised with a knife, and the needle inserted between the two tracheal rings in the direction of the chest. The material is injected slowly into the trachea, the head of the animal being kept elevated during the process to prevent the fluid flowing into the larynx. The agents used appear to act only upon the worms and embryos in the trachea and upper portions of the bronchial tubes. On one occasion I gave an intratracheal injection of one of the above mixtures to a calf evidently in a moribund condition. Two days afterwards it died. At the *post-mortem* examination the bronchial tubes were crammed full of living strongyles and their embryos, and there were also numerous strongyles in the trachea. Liquids injected into the trachea are rapidly absorbed, oil emulsions less rapidly than watery solutions, but they do not mix so readily with the mucus which surrounds the worms; hence the treatment requires to be repeated. Calves in a weak condition occasionally collapse after the injection, and when pneumonia sets in from the irritation of the embryos and the inoculation of bacteria, the injections are of no service. In those cases which recover on account of some strongyles being left the animal continues to cough for a time after treatment. In order to ensure that the anthelmintic mixture injected may reach the smallest bronchial tube and may thus come in contact with the worms and their embryos, Scheibel has introduced a spraying apparatus instead of a syringe. He employs first a special curved trocar and cannula, which he inserts into the trachea in the direction of the thorax. To the end of the cannula are attached two rings, by which it is kept in position during treatment by means of tape tied round the neck. After the trocar is removed the stem of a V-shaped spraying tube is inserted into the cannula. To the branches of the tube are attached indiarubber tubes, one in connection with the bellows for blowing in air, the other attached to the vessel containing the vermicide mixture.

The mixture he uses consists R creosote, 1 part; rectified spirit and water aa, 50 parts; dose 2½ to 5 dr. During the spraying process the vessel is held lower than the cannula so as to prevent the fluid flowing into the trachea. A pause is made when a fit of coughing sets in. The spraying is carried out daily for three days with invariable successful results. The method deserves a trial in this country. Intratracheal injections are not indicated when marked symptoms of pneumonia set in. The symptoms of the disease disappear with the onset of frost. As in all worm infections, a generous diet is of as great importance as the medicinal agents. In one outbreak in 1908 thirteen calves were affected; three died before treatment. I housed one of the most advanced cases, gave it no medicine, but allowed it 1 lb. of linseed cake per day in addition to other food; the others were allowed out, and were given intratracheal injections. All the animals recovered, and the untreated calf did as well as the others. It may be said, of course, that it was protected from further infection by being housed.

Among young sheep from three to nine months old a similar condition is set up by *Strongylus filaria* (*Dictyocaulus filaria*). This affection is treated in the same way as in cattle, but the doses employed are half to a

quarter less. Zieman recommends as an intratracheal injection a mixture consisting of equal parts of a solution of iodine (iodine, 2 parts; potassium iodide, 10 parts; water, 100 parts), and oil of turpentine and olive oil, to make an emulsion. The dose is 75 to 120 minims, and administered every other day on two or three occasions. It is difficult to apply the treatment to a large flock.

Lung lesions in the sheep, occasionally in the goat, are produced by the *Strongylus rufescens* (*Synthetocaulus rufescens*), and *S. Capillaris* (*Synthetocaulus capillaris*). In this country very few sheep are free from small dark nodules in the lungs due to one of these nematode parasites. Occasionally small patches of broncho-pneumonia are set up by the *S. capillaris*, but they do not appear to cause any serious disturbance. Very occasionally an acute pneumonia is set up, probably as the result of a bacterial complication. The infection in this case may be carried by the hay in animals which are housed. Intratracheal injections or fumigations can have no effect upon these diseases. Good feeding and stomachics, such as salt and sulphate of iron, are all that can be recommended. In young pigs in which a verminous bronchitis is set up by *S. paradoxus* (*Metastrongylus apri* and *M. brevivaginatus*) intratracheal injections are hardly admissible. Various mixtures containing assafœtida are often given, but prophylactic measures are of the greatest importance, consisting of the destruction of the affected animals and the disinfection of the discharges and the pig-styes. The disease may cause no serious trouble. In cats, lesions in the lungs similar to those produced by the *S. rufescens* in sheep have been occasionally produced by *S. pusillus* (*Synthetocaulus abstrusus*). Intratracheal injections have been suggested, but are not likely to be of much service. In many species of birds a verminous tracheo bronchitis is set up by the *Syngamus trachealis*. Great mortality often results in chickens before they have got their feathers. One method of treatment consists in inserting a feather (from which the barbs have been removed save at the tip), through the mouth into the trachea, twisting it round, and pulling it out. Some of the worms may be removed from the upper portion of the trachea, especially if the feather is first dipped in oil of turpentine. This method is inadmissible with very small birds on account of the small size of the trachea. Good results have been obtained by intratracheal injections of a five per cent solution of sodium salicylate. 1 c.c. (15 minims) is introduced with a syringe either through the mouth or by a bent needle pushed through the skin into the trachea. The worms drop off the mucous membrane after the injection, and expelled by violent attacks of coughing. Fumigation with sulphur dioxide or tobacco smoke is not so useful. To prevent reinfection, 1 per cent. salicylic acid is added to the drinking water, the sick birds separated, and the runs, coops, etc., carefully disinfected by 1 per cent. salicylic acid or sulphuric acid, and the ground turned over.

Nematodes of the Circulatory System.

I have already referred to the *Strongylus vulgaris* in the equines Filariæ appear in various parts of the circulation of the horse, ox, and dog. The treatment of these conditions is symptomatic and unsatisfactory. Pease observed considerable improvement in horses affected with *Filariæ sanguinis equi* in India from the use of cacodylate of sodium. Perhaps this drug, or similar agents, such as atoxyl, might be of service in the conditions due to *Filariæ immitis* and *Strongylus vasorum* (*Hæmostrongylus vasorum*) in the dog. In Egypt, Mason found no medicinal treatment of service in dealing with disease due to filariæ in the blood of camels.

Nematodes in other situations.

The worms in the connective tissues are no more effectively dealt with by drugs than those in the blood. The tumours caused by *Onchocerca reticulata* in the tendons of horses can be removed only by excision, but Pader and Druin consider antiphlogistic treatment best. The tumours may disappear spontaneously. This also obtains with the periodic patches of hæmorrhage on the skin seen in Hungarian, Russian, and Tartary horses due to *Filaria Hæmorrhagica*. If the affected areas are kept clean and undisturbed the disease spontaneously disappears. "Summer sores" in equines, caused by the *Filaria irritans*, are best treated by complete excision of the granulations, and the application to the wound of strong antiseptics, such as 30 per cent. copper sulphate solution, an alcoholic saturated solution of picric acid, a 10 per cent. to 20 per cent. alcoholic solution of salicylic acid. Rey recommends the application of arsenic sulphide. A dry scab about ½ in. thick forms, which falls off after eight to ten days, and healing soon occurs. No satisfactory treatment is applied to the worm nodules caused by the *Onchocera gibsoni* in cattle. The treatment for *Filaria oculi* in the horse and *Filaria medinensis* in men and animals is purely surgical.

In cattle and other animals, conjunctivitis set up by varieties of thelaziæ are successfully treated by first cocainizing the eye and removing the thelizia with forceps, or by instilling 1 per cent. creolin or corrosive sublimate 1-2000 into the conjectival sac daily for some days to get rid of the parasite. One may also have recourse to the prolonged irrigation to expel the worms. If the presence of *Eustrongylus gigas* in the kidneys or other organs is ever diagnosed its removal will be purely surgical; no drugs are likely to act.

Discussion.

The Chairman: The first thing that strikes me is that the paper complies with all the conditions that Sir Joshua Reynolds lays down for judging a picture. He said that a picture should, not only show that it was well done, but that it was done with ease; I am perfectly certain that Prof. Craig's paper fulfils both these conditions. It shows that he is a master of detail, and he is not alone a genius in that way, but he has put a tremendous amount of hard work into his paper, showing the different doses and drugs, and the different ways in which they are to be compounded. For some time past I have thought the study of therapeutics was one of the lost arts, and that the books had been relegated to the lumber room. Prof. Craig shows that that is not so. Our old friend, Mr. John Holland always had a very strong idea against letting prescriptions be known to the chemists, and to people with dogs and horses particularly. He always considered it an element of danger to the practitioner. If that element of danger ever exists, it exists *in excelsis* in Prof. Craig's papers which give so many formula, which are only intended for our enlightenment. If we could do anything to stop these fellows getting the benefit of a magnificent paper like this, enabling them to make up these medicines it would be for the protection of the practitioner. I do not know, but it might be a difficult matter, but it would be well if something could be done in that direction.

Mr. Cargill Patrick: The subject for discussion is one especially suitable for this country, as parasitism is rampant from many causes: amongst them being the entire absence of tillage on large tracts of land on which all kinds of stock have been grazed for, probably, generations, resulting in a prolonged infection, or, where tillage might be impracticable, in a total lack of suitable dressings, which are often an absolute necessity and most beneficial to the stock, particularly with a humid atmosphere and very imperfect drainage. The

title chosen by the essayist almost begs the question whether drugs are indicated in disease caused by nematode worms or not, and the text even goes to prove how futile they sometimes are, a view in which I heartily concur; so much so that while treating these cases my routine practice is to build up the system as much as possible, which undoubtedly has the effect of augmenting the phagocytes of the blood, and these in turn prove inimical to the well being of any bacterial invasion caused by nematodes or otherwise. We are working along pretty much the same lines when we administer iron as a medicament, and many of the much vaunted remedies contain either iron or copper, gaining considerable credit as vermifuges according to the quantity of worms expelled after their administration, whereas it may be purely a coincidence. Every owner of horses knows that worms are often expelled in large quantities without any medical treatment and at all seasons of the year, probably due to several causes—digestive disturbance with unusual bowel activity, or, it may be the chemical composition of the food stuffs operating; or, again a spontaneous effort on the part of the parasites to gain new quarters. Yet it is to be admitted that we must practice the time honoured custom of giving medicine in these cases, if only for the sake of preventing our reputation being tarnished and our ledger accounts considerably curtailed, a somewhat humilating confession; but in this age of charlatanism and advertising much tact is necessary.

I was much interested in the statement that "Ascarides occasionally cause impaction and even rupture of the bowel in horses," as I have never met with the condition, though I have seen impaction and enteritis from tapeworm infection in thoroughbred foals which, to all external appearance, were in perfect health. The nervous symptoms sometimes observed in these cases might be attributed more to the action of toxins formed than to mechanical irritation, though no doubt both causes operate. The toxin theory I have connected hitherto, and probably with a certain show of reason, with some of these locomotor ataxia cases, especially when they have responded to cathartic and electrical treatment. The rôle of these worms as bacteria carriers seems most serious, and for that reason a reliable vermicide, or even vermifuge, would be welcomed by most veterinarians, but so far no specific has been discovered for the various nematodes, the known or reputed drugs we use for this purpose seem less efficacious in the bowel infestations than in other positions of the body.

I note the essayist advised the use of astringents in cases where diarrhœa is present; this is surely an instance when removing the cause is the first essential, and astringents would be contra indicated. I am speaking advisedly on the point, having tried both methods and until the worms have been got rid of; astringents are useless in some cases. As to the various remedies employed in horse practice for bowel parasitism a good all round worm draught may be made up of linseed oil, turpentine, treacle, and new milk, administered fasting: or thymol and milk as suggested, though for the tetracanthus nothing short of intravenous injection of atoxyl have I found of the slightest service. Whilst on this point, I would ask whether any of the members present have noted any heart lesions afterwards which might reasonably be connected with said intravenous injections. Or is it more probable that they are the direct result of emboli produced by the worms under treatment. Personally, I incline to the latter view. For the *Strongylus micrurus* in calves, Penhale's injection of ol. tereb., acid carb. and chloroform seems most useful. Sulphur fumigations are too risky unless carried out under veterinary supervision, and this is not always convenient. Scheibel's apparatus seems most practical, and well worthy of trial for intratracheal medication. In the treatment of stomach worms I find tobacco very useful in many instances. I think M'Fadyean recommends lysol in some cases as a specific.

I find mention of the use of carbon disulphide in the treatment of worms in horses. It is a very powerful drug and has to be carefully administered, particularly in the case of young horses; and in small doses, or you may have the animal die under treatment. There is usually more success in the case of smaller animals, probably owing to the facilities with which medicine can be administered, and the alimentary canal can be cleared out in a short space of time. With ascarides in smaller animals, medicine can operate with a great deal more certainty.

I wish to thank the essayist for the elaborate paper he has prepared, and trust that members present will give their experiences of various treatments, so that some practical outcome may result.

Mr. NORRIS: I regret to say I have not made a careful study of this paper which Professor Craig was kind enough to prepare for us. I have looked through it this evening, and will deal with the points which struck me as they occur in the paper. I may as well say at once that I believe drugs are absolutely useless in many cases of nematode worms. Professor Craig, in stating the various effects of nematodes on the system, does not mention the fact that a certain nematode was found to produce stomach tumours.

Prof. CRAIG: In rats!

Mr. NORRIS: Yes, some experiments on the point were made in Copenhagen some months ago and they were looked upon as a valuable contribution to cancer research. A far more important point for discussion than the drug treatment of nematodes is in the manner in which they produce their effects. Prof. Craig says "some species of nematode worms appear to produce no symptoms, and even although those which occasionally do so may be present in considerable numbers the host may appear in excellent health." In this I agree. But how are these two conditions to be explained. The same thing occurs in bacterial diseases, such as those produced by Gaertner's bacillus. Prof. Craig explains the pathological action of nematodes in several ways, such as mechanically producing lesions, elaborating toxins, aiding bacterial invasion. If they produce toxins in one case and thereby set up serious disease, why is it toxins are not produced, or, if produced, have no serious effect in other cases? In answer to this I suggest that the result may depend as much upon the condition of the host—whether it is in a state of immunity or anaphylaxis—as upon the presence of the parasites. Is it not possible for the host to automatically immunise itself if the parasitic invasion and the consequent elaboration of toxins are gradual; and on the other hand is it not probable that the defences of the host will be rushed if there is a massive and rapid invasion. With regard to the statement that nematodes aid and abet bacteria in the production of lesions, I think this theory so far has largely been taken for granted, and I would like some specific instance of disease proved to be due to the co-operation of these two agencies.

As I said before, I am an unbeliever in the efficacy of the drug treatment, and strongly hold that prevention is the line to adopt. I agree with Mr. Patrick—that if there were more tillage in Ireland there would be less parasitism. A farmer who breaks up his land frequently will have little trouble from this curse, but as older apparently healthy stock often harbour parasites they are therefore liable to infect young animals when grazing together even on clean ground. The ideal condition is to rear young animals on clean ground and apart from older stock of the same species. Prof. Craig speaks of dressing infected lands with 3 to 5 cwts of salt per acre. This amount I consider is too small and more likely to give the worms an appetite than to have deleterious effect on them. I am rather surprised to find Prof. Craig

quoting a series of experiments carried out by M'Fadyean about twenty years ago, and which I believe are of little or no value. Shortly. the experiments consisted in putting live worms in watch glasses containing solutions of various drugs. Now I think this is a most unsatisfactory way to ascertain the effect of drugs upon worm parasites, chiefly for the reason that the worm is removed from its natural habitat and is therefore brought directly in contact with the trial drug in a very debilitated state, in an unnatural environment. I fail to see their importance, or that of any other experiments which are not carried out on the living animal with the parasite in its natural habitat and under natural conditions.

I agree with Prof. Craig that as a rule the smaller the species of nematode worms the more important it is from a pathological view. With regard to diagnosis, I am inclined to think sufficient use is not made of the microscope in examing fæces for eggs in case of wasting disease. It may be difficult at first to recognise the ova of the various species of parasites, but after some practice a useful knowledge is obtained which is very valuable in diagnosis of such cases. I do not agree that the common ascarides found in swine are a frequent cause of epileptiform convulsions in that animal.

In a ten years' experience, during which I have made some hundreds of post mortems, I am decidedly of opinion that intestinal parasitism in swine and convulsions do not hang together as cause and effect. The only case I can call to mind which might be attributable to parasites was one in young pigs, and the worm in that case was the Tricocephalis in the cæcum. Convulsions in young swine, are no doubt pretty common, and appear to be caused by overeating, and indigestible food, causing gastritis and stretching of the stomach. I think the same remarks on drug treatment apply to the respiratory tract. Take the case of Hoose, a great number of animals will recover and are better without the application of drugs. Here, again, the proper remedy is not drug treatment, but prevention, and I think Prof. Craig agrees with me, because he is not very strong on advocating drugs in all cases, and in two or three places points out they are more or less useless. I do not think the new method of applying drugs advocated by some gentleman with a German name will prove more effective. Before I sit down I would like to mention a paper on much the same subject, read by Mr. Magee at a previous meeting. Briefly I may say I agree with the views expressed by Mr. Magee in that paper, and I think the fact that 80 per cent. of dissecting room subjects were found to harbour similar parasites without apparent injury, is not a strong argument against Mr. Magee's opinion.

(To be concluded.)

On the Antiseptic action of Hypochlorous Acid and its application to Wound Treatment.

A series of experiments have been made, in the course of an investigation undertaken at the request of the Medical Research Committee, by Messrs. J. Lorrain Smith, M.D., F.R.S., Professor of Pathology; A. Murray Drennan, M.B., F.R.C.P.E., Professor of Clinical Pathology, University of Otago, N.Z.; Theodore Rettie, D.SC., Research Assistant under Medical Research Committee; William Campbell, M.B., B.SC, LIEUT. R.A.M.C., Demonstrator of Pathology, (from the Department of Pathology, University of Edinburgh); and is reported in *The British Medical Journal* of July 24. The following extracts give the main statements. There are six pages of tables and results also given in the report which will be of interest to those desirous of following clinical details.

"The primary object of the investigation was to find an antiseptic which could be applied as a first dressing in the field to prevent sepsis.

The ideal antiseptic for the type of infection which occurs in wounds received in the field must possess the power of rapidly destroying spores as well as ordinary bacterial forms. There are two chief laboratory methods of investigating the action of antiseptics:

1. By testing their action in killing or preventing the growth of organisms on artificial culture media.

2. By testing their action in sterilizing infected organic matter.

We employed both methods, but especially the latter, as the conditions here resemble more closely those occurring in infected wounds containing much necrotic tissue or other organic matter.

It has been accepted, especially by those working at disinfectants for public health purposes, that the hypochlorites are among the most potent germicides. Rideal, using carbolic acid as a standard, expresses the germicidal power of hypoclorites as carbolic acid, 100; hypochlorites, 14,600 to 22,000.

Used mainly in the form of bleaching powder, the hypochlorites have been largely employed for sterilizing water supplies, but their use in general surgery as antiseptics has been very limited. As far back as 1846 Semmelweis stamped out an epidemic of puerperal fever in Vienna by the use of bleaching powder. "Eau de Javelle" (a solution of alkali hypochlorite), has been used with success in surgical practice.

The fundamental practical difficulty in the use of hypochlorites is that in solution they rapidly lose their strength by decomposition. In the case of Eau de Javelle this difficulty has been overcome by making a strongly alkaline solution; but this constitutes a new difficulty, in that such a highly alkaline solution cannot be applied to the tissues unless greatly diluted.

Hypochlorous Acid.

In our observations we found that hypochlorous acid is a more potent germicide than its salts, and we have accordingly devised a method in which the free acid is employed as the antiseptic agent. The acid may be used as a gas or as a solution in water.

For use as an antiseptic, the gas is most conveniently prepared by the action of boric acid on bleaching powder in the presence of a small quantity of water.

The solution is obtained when the same action occurs in the presence of a large quantity of water.

For convenience, we have given the name "Eupad" to a powder consisting of equal weights of finely ground bleaching powder and powdered boric acid intimately mixed; while the solution of free hypochlorous acid prepared in this way we have named "Eusol."

Methods of Preparation and Chemical Notes.

To prepare the powder, ordinary commercial bleaching powder or chloride of lime is ground in a mortar to a fine powder, and then intimately mixed with an equal weight of boric acid powder. The mixture should be kept in closely stoppered bottles, and not exposed to light more than necessary.

The solution may be prepared by two methods:—

1. Twenty-five grains of Eupad are shaken up with 1 litre of water, allowed to stand for a few hours, then filtered through cloth or filter paper.

2. To one litre of water add 12.5 grams bleaching powder, shake vigorously, then add 12.5 grams boric acid powder and shake again. Allow to stand for some hours, preferably overnight, then filter off, and the clear solution is ready for use.

This solution contains :—

Hypochlorous acid	0.54	per cent.
Calcium biborate	1.28	,,
Calcium chloride	0.17	,,
	1.99	

The hypochlorous acid is estimated by titration with N/10 arsenious acid solution ; this method is best, as the presence of chlorates does not affect the result.

The chemical reaction involved in the preparation of hypochlorous acid by the method described may be represented by the following equation :—

$$2CaOCl_2 + 2H_3BO_3 = 2HClO + CaB_2O_4 + CaCl_2 + 2H_2O.$$

If the reaction takes place in the presence of a large quantity of water, a solution of hypochlorous acid is formed ; if little water is used, gaseous hypochlorous acid is given off.

The hypochlorous acid in the form of a gas is more mobile, and will be absorbed by the tissue more rapidly and in larger quantity than from the solution ; this will explain its greater efficiency as an antiseptic.

As the ultimate decomposition product in the tissue is hydrochloric acid or sodium chloride, there is no reason to fear toxic absorption from this antiseptic.

A concentration of 0.5 per cent. hypochlorous acid has been found the most satisfactory. Stronger solutions may be prepared by this method, but no advantage is gained, as they rapidly lose strength, coming down to about 0.5 per cent. free acid, after which they decompose more slowly ; for practical purposes a solution of 0.5 per cent. remains effective for from three weeks to a month.

Andrewes and Orton found that very dilute solutions of hypochlorous acid have intense antiseptic properties. They showed that a suspension of *Staphylococcus pyogenes aureus* in pure distilled water was sterilized in one minute by the presence of one part of HClO in 100,000. In a suspension in broth 1 in 5,000 did not, but 1 in 3,000 did, kill the staphylococcus in thirty minutes. From this they concluded that the potency of the pure acid was so much diminished by the presence of organic matter that it was unsuited to ordinary use.

As a solution of 0.5 per cent. HClO may be safely applied to open wounds, the objection which Andrewes and Orton have based on experiments with very dilute solutions does not apply.

A series of experiments were done with anthrax cultures containing spores. An agar culture was emulsified with 5 c.cm. of normal saline, and equal amounts of Eusol of different strengths were added ; 2.5 to 3 c.cm of this mixture were injected subcutaneously, either at once or after periods of one to five minutes. Emulsions were also made with the Eusol alone, 5 c.cm being used to wash off one agar culture, and 2 to 3 c.cm of this injected subcutaneously. Controls were done with equal amounts of anthrax emulsion alone in saline, and with emulsions of anthrax in 1 in 20 phenol.

Even where the unfiltered emulsion was injected death was delayed as compared with the phenol experiments ; death was due to the survival of organisms in the lumps. The experiments with filtered emulsion bear this out. Where phenol was used the animals died in every case, even although the phenol was allowed to remain in contact with the anthrax for fifteen minutes before injection.

These results are quite in keeping with the previous results of the action of Eusol on anthrax cultures, and they show that the organisms are killed, and have not merely their power of growth inhibited. Further, the spores are killed as well as the bacteria.

A microscopical examination of a drop of fresh blood mixed with an equal amount of 0.5 per cent. Eusol showed no obvious change in either red corpuscles, leucocytes, or platelets ; at the end of a quarter of an hour a finely granular precipitate appeared in the film, which became slightly opaque ; the colour of the hæmoglobin was not discharged.

Further investigation is required to define the nature of the reaction which hypochlorous acid causes in the tissues. Although it kills organisms so rapidly, no disintegration occurs ; and there is no apparent breaking down of tissue cells.

It is to be noted that hypochlorous acid tarnishes metals, and therefore instruments should be kept in a separate cupboard, and not left in the solution longer than necessary. It bleaches and destroys cloth fabrics if left in contact with them for a prolonged period.

An important point is that the ingredients are easily obtained, and at a very small outlay. The cost of making one gallon of Eusol is approximately one penny.

Conclusions.

Comparative tests confirm the conclusion already arrived at by various investigators that hypochlorous acid is the most powerful antiseptic known.

The advantage of using the gas is that it will penetrate and will act at a distance.

Both the gas and the solution, while extremely potent against organisms and their spores, cause little or no harm to the tissues.

The effect of this antiseptic is purely local ; the decomposition products are devoid of toxicity, and there is therefore no danger to be apprehended from absorption.

A flow of lymph is induced from the wound as part of the reaction of the tissues.

Fetor is rapidly eliminated.

If pain and irritation occur they can be easily controlled by reducing the concentration of the antiseptic.

The practical advantages of this antiseptic for *field use* are :—(*a*) It can be used as a dry powder and therefore obviates the difficulty of procuring water. (*b*) It can be introduced into the gauze pad of the first field dressing. (*c*) Where water is available the same powder can be made up as a lotion for general use.

The constituents of the powder are inexpensive and easily procured ; and the preparation of the antiseptic is extremely simple.

Australia produces yearly wool to the value of £24,000,000, and its manufacture, when exported, gives employment, directly and indirectly, to about one million people. The value added after the wool leaves Australia is estimated to be about £50,000,000.

Personal.

Crowhurst.—On the 12th August, at Earls Place, Maidstone, the wife of Cecil Crowhurst, M.R.C.V.S., of a son.

Lieut. Stanley H. L. Woods, A.V.C., M.R.C.V.S., has been presented with the Freedom of the City of London.

Lieut. Woods was sworn in and signed the Roll on July 29th, at the Guildhall.

Mr. James Borthwick, M.R.C.V.S., Kirkliston, who was referee for the H. & A. S. show, agreed to act, with Principal McCall and Mr. Wm. Brown, as veterinary inspector for the Cawdor Cup for the females at the show at the Edinburgh Agricultural Association.

Mr. J. A. Hepburn, M.R.C.V.S., Milnathort, served as secretary to the show committee of the Kinross-shire Agricultural Society : and

Mr. W. Findlay Houston, M.R.C.V.S., Paisley, was one of the judges for Light-legged horses.

Swine Fever—The use of Calomel.

One of the recent suggestions with regard to the treatment and prevention of swine fever is the use of calomel. It is contained in a report issued by two Italian investigators, who state that they have been very successful in the control of swine plague in the province of Arezzo, a district in which the disease has wrought great havoc for many years. The report continues: "In over 100 cases treated with calomel, not a single death occurred, while in infected control styes in some cases as many as 90 per cent, of the animals succumbed. The remedy appears to be most efficacious when it is administered before the disease is far advanced, and is best given on the first appearance of the symptoms. Its effect is doubtful in advanced stages of the disease. The doses which can be safely given per head are as follows: 1 gr. per dose for sucking and young pigs, 2 to 2½ grs. per dose for half-grown pigs, 4 grs. per dose for adult pigs. In the case of pregnant sows the dose is best administered in three portions within thirty-six hours. The calomel should be given in a boiled potato or in a meal of honey mash which is fed to the pigs. If after two or three days no marked improvement in their condition takes place, the same dose should be repeated or even given a third time. In no case was any ill effect noticed on the organism by so doing. Calomel was also given to healthy pigs in an infected stye, and it was observed that those animals did not fall ill, which proves that calomel is a prophylatic as well as a remedy.

Anti-Fly Dressing.

The following formula is suggested for a preparation to prevent flies from settling on men and horses:—

Pyridine	1 part
Thymol	½ part
Safrol	5 parts
Oil of Birch Tar	5 parts

Sperm Oil—sufficient to produce 100 parts.

The birch tar oil and safrol mask the odour of pyridine when applied, and, in conjunction with thymol retard its volatilisation. The fluid does not irritate the skin, and a thin film may be smeared on the temples, on the head behind the ears, and on the back of the hands. This should be renewed every few hours, but when applied to leather less frequent renewal will be required. —*Pharmaceutical Journal.*

Dry Dressing for Wounds.

A powder consisting of one part of Chlorinated Lime and nine parts of Kaolin or Fuller's Earth is recommended for dusting wounds. It is said to be entirely harmless, while it deodorises, reduces secretion, and stimulates tissue repairs.—*Pharmaceutical Journal.*

ARMY VETERINARY SERVICE

Extract from *London Gazette*,

War Office, Whitehall, August 12.

Regular Forces. Army Veterinary Corps.

To be temporary Lieutenant:—
G. Sutton, F.R.C.V.S. Dated Aug. 1.

Aug. 13.

To be temporary Majors:—
Capt. A. S. Head, Res. of Officers; Temp. Lieut. F. T. G. Hobday. Dated Aug. 14.

Aug. 16.

J. D. Broome to be temp. Capt., and not as stated in *Gazette* of Aug. 3.

Aug. 17.

To be temporary Lieutenants:—
R. Colthurst. Dated July 17.
F. J. Ahams. Dated July 20.
M. J. Brett, G. K. Shaw, W. H. Heaney. Dated Aug. 1.
J. McLean. Dated Aug. 2.
J. Edgar. Dated Aug. 4.

Aug. 18.

Capt. W. C. Quinnell, late Australian Forces, to be temp. Captain. Dated July 28.

To be temporary Lieutenants:—
S. Villar, F.R.C.V.S., T. Russell. Dated Aug. 1.
T. A. McC. Finch. Dated Aug. 2.

Surname of Temp. Lieut. W. Lenton is as now described, and not as stated in *Gazette* of July 9.

Aug. 14.

Territorial Force Reserve.

Capt. J. S. Channon, from Army Vety. Corps (T.F.), to be Captain. Dated Aug. 15.

Mediterranean Exp. Force. Army Vet. Corps.

The following casualties in the Mediterranean Expeditionary Force are reported:—

Wounded—Pte. H. T. Beamon, 4166; Pte W. M. Cooper, 3590.
Wali Muhammad, Veterinary Jamadar, Supply and Transport Corps.

OBITUARY.

Albert Marshall, M.R.C.V.S., Victoria Road, Dartmouth, S. Devon.

Graduated, Edin.: July, 1886.

Mr. Marshall died on August 6th. Aged 50.

George Alexander Thompson, M.R.C.V.S., City Chambers, Edinburgh.

Graduated, Edin.: Dec., 1891.

Mr. Thompson's death occurred July 1st.

A.V.C.—A CONCESSION.

Sir,

It is from the ranks of the general practitioners that the A.V.C. must look for recruits. (Presumably, the Department will only allow a certain number of its staff to join). No doubt there will be a rush of general practitioners after the latest "concession." Surely there was never a more damnably unfair proposal, but we are a longsuffering crowd.

What does the Department officer come back to?—His fat job.

What does the general practitioner come back to?—a practice suffering from pernicious anæmia.

I should dearly like to tell some stories about what you, Mr. Editor, so kindly call "specialists in the control of contagious diseases." I venture the opinion on my own, that the general practitioner of over five years standing is a ten times better man in an army sick lines than the aforesaid specialist. As "Strafe" points out, *their* labours are more amongst the porcine community than the equine.

However, as long as the great god "codology" is worshipped, we general practitioners can whistle. "Strafe" and your humble servant have done their duty in protesting, but by the look of your correspondence column, we are only "crying in the wilderness."—Yours.

Anti-Humbug.

New Serum for Wounds.

The *Matin* announces the discovery of a new "Polyvalent" serum, due to the labours of MM. Leclainche and Vallée, professors at the Veterinary College at Alfort.

According to a military surgeon, the results obtained are almost miraculous; soldiers who were horribly mutilated and whose wounds were so infected that their lives were despaired of, have made rapid progress, and are now on their feet, anxious to know when they will be allowed to rejoin their comrades in the firing line.

At present not more than 2,000 phials a day of the new serum can be made owing to the shortage of the staff, and it has only been possible to use the "Polyvalent" serum in the hospitals at the base.

When it can be applied as a preventive in the firing line, like the anti-tetanic serum, thousands of additional human lives will be saved.—*Evening News*, Aug. 10th.

[It is gratifying to the profession to learn that these two distinguished members of our profession (both of whom are Hon. Associates of the R.C.V.S.) have been able to be of great service in the treatment of terribly infected wounds of soldiers as well as horses. This fact alone goes to show the progressive importance of veterinary science, and therefore that it should be more thoroughly cultivated in the United Kingdom, or rather in the British Empire, than hitherto.

But the veterinary surgeon should be given a chance and not have his preserves poached on by those who do not always make the best use of their own.—H. G.]

*** The foregoing was unavoidably held over last week.

Prosecution by the R.C.V.S.

Illtyd Stewart, 28, haulier, Newport, was fined £5 and £5 5s. costs by the Caerphilly magistrates on Aug. 10 for using and taking the discription of a veterinary surgeon while not registered.

Mr. Lyndon Cooper, Newport, prosecuted on behalf of the Council of the Royal College of Veterinary Surgeons, and said it was an offence against the Veterinary Surgeons Act of 1881. Defendant had been carrying on the business of veterinary surgeon for a considerable time at Caerphilly and Senghenydd, representing himself as qualified. On June 1 he had come to this very Court and said on oath he was a veterinary surgeon, and that he was duly registered.

Mr. Edgar George Haggett, Newport, produced the register of the Royal College of Veterinary Surgeons for 1915, which showed that defendant was not a member of the College, and was, therefore, absolutely unqualified.

Mr. R. Y. Evans (magistrates' clerk) produced the depositions made by defendant in a case at Caerphilly Police Court on June 1 last. Defendant in evidence on that occasion said: "I am a veterinary surgeon, and live at Caerphilly," and also stated in cross-examination, "I am the only veterinary surgeon in Caerphilly, and I am registered."

Defendant did not appear, but was represented by Mr. C. Reginald Harrison, who said defendant did not realise that he was doing anything wrong, as he had a practice. He expressed regret on defendant's behalf.—*The South Wales Argus.*

DISEASES OF ANIMALS ACTS 1894 TO 1914, SUMMARY OF RETURNS.

Period.	Anthrax		Foot-and-Mouth Disease.		Glanders.†		Parasitic Mange. ‡		Sheep Scab.	Swine Fever.	
	Out-breaks (a)	Animals.	Out-breaks (a)	Animals.	Out-breaks (b)	Animals.	Out-breaks (b)	Animals.	(b)	Out-breaks (a)	Slaughtered. *
GT. BRITAIN. Week ended August 14	7	9			1	1	8	19		59	267
Corresponding week in 1914 ...	11	11				2	5	6	1	61	224
Corresponding week in 1913 ...	6	7			2	2	34	54	2	61	551
Corresponding week in 1912 ...	5	5	4	25	1	3	19	33		40	427
Total for 33 weeks, 1915	407	467			36	64	‡555	‡1219	159	2871	12853
Corresponding period in 1914 ...	505	546	11	74	70	216	1516	2628	151	2711	28412
Corresponding period in 1913 ...	367	402			110	286	1880	3798	127	1634	21903
Corresponding period in 1912 ...	550	626	67	435	118	226	2317	5050	170	2154	27958

‡ The Parasitic Mange Order of 1911 was suspended from 6th August, 1914, to 27th March, 1915, inclusive.

(a) Confirmed. (b) Reported by Local Authorities. † Counties affected, animals attacked: Stafford 1.

Board of Agriculture and Fisheries, August 17, 1915. ‡ Figures for twenty weeks only.

IRELAND. Week ended August 14	...	...	...	...	...	...	Outbreaks 3	5	5	23
Corresponding Week in 1914 ...	...	...	...	...	...	...	2	1	6	24
Corresponding Week in 1913 ...	...	...	...	...	...	...	2	5	3	5
Corresponding Week in 1912 ...	...	...	5	10	...	...	1	...	3	5
Total for 33 weeks, 1915 ...	1	1	...	...	1	3	49	275	170	949
Corresponding period in 1914 ...	1	1	76	957	...	...	58	380	150	744
Corresponding period in 1913 ...	...	...	...	...	...	...	96	358	106	613
Corresponding period in 1912 ...	3	3	21	213	...	...	51	262	170	1441

Department of Agriculture and Technical Instruction for Ireland, (Veterinary Branch), Dublin, August 16, 1915.

NOTE.—The figures for the Current Year are approximate only. * As diseased or Exposed to Infection.